

## TECHNOLOGICAL ANALYSIS

### 1 Fabric

The 'Belgic' pottery of SE England is characterised by the black inclusions that are obvious to the naked eye. It is these that are grog, which under a microscope may be seen to have their own inclusions. The ware is not gritty and rough as when mineral tempering is prominent. The matrix is usually grey, sometimes brown, and the surfaces are of similar dark colours but never quite black. In the Study Group for Romano-British Coarse Pottery's colour chart (1977) Green/Brown 1A approximates to the colour often appearing on the surfaces, and Green/Brown 4A represents the core, but there is a great deal of variation. These grey wares have black inclusions; the red-brown wares (below) have red inclusions, and a piece with grey core and red surfaces will have both.

The fabric is easy to recognise (and corresponds exactly to the definition of grog in Peacock's Key to identification of common inclusions in pottery in Peacock 1977, 30-32). In appearance it is the same wherever it occurs, except for the hardness of some grog-tempered pots of Zone 5. Analysis by thin section confirms the homogeneity of the fabric. Sherds from a number of sites, including Brickwall Hill, Braughing, Nazeingbury and Canterbury, were sectioned, and were indeed found to be very similar in composition. (I am indebted to Lea Jones for this work).

Every example had scattered grains of fine silty quartz, usually c. 0.1mm in diameter; muscovite mica (often visible to the naked eye); and iron oxide particles, usually c.0.1mm in diameter. All of these were natural to the clay. Also present were lumps of clay stained with carbonaceous material, c.0.4mm in diameter or larger. One piece from Skeleton Green had marly inclusions, pale buff, dark red-brown, and black, 0.5mm. The Canterbury samples, much harder- than those from elsewhere, were exactly similar apart from finer quartz grains, often only c.0.025mm. The Canterbury sherds did not need consolidation before sectioning, unlike the others; presumably they were fired to a higher temperature, but there are no isotropic minerals to indicate a minimum temperature of c.850°C. 800° might be appropriate for all of this pottery.

Its typology indicates many local centres of manufacture; and the sources of the clay are undoubtedly also local. Nowhere in the area under consideration can be very far from clay deposits, undistinguished by rare minerals.

### 2 Manufacture

It would seem that the use of grog as tempering is a deliberate choice in preference to other materials such as shell or crushed flint, with the purpose of making the clay mix easy to use on the wheel, and for the effect on the finished product. The fabric is ideal for burnishing the surface: a hard smooth tool

compacts the surface of the clay, and there are no sharp-edged large inclusions to be dragged out leaving holes and scratches. The burnishing often has the effect of darkening the surface colour, and this is not a slip or paint. Such an application would show up easily under the microscope as a sharply distinct surface layer. The surface shine is the major decorative element on this pottery; additional burnished or incised line decoration is widespread but by no means the rule. The elegantly curving shapes in general need no surface treatment other than a good shine. This burnish is common on hand-made grog-tempered vessels as well as on wheel-made; the plainer utility wares (the C section in the type series) are the only forms commonly without a burnish.

The forms reflect the use of the potter's wheel. Some, such as barrel jars and butt-beakers, are based on the cylinder shape, with rim and base diameters approximately the same, that would not be produced naturally by coil building. The characteristic curves and cordons are products of shaping on the wheel. Some elements are formed in the first shaping of the pot in wet clay, and some will be added later when the vessel has had time to dry a little and stabilise, and is placed back on the wheel-head (not always easy to do if the pot is to be centred accurately).

In the former category would belong the corrugations of forms such as D3-5, and rippled shoulders as in B2 forms; the potter's fingers support the inside of the vessel and help form the corrugations. Occasionally a template may have been used for some of the sharper forms.

Cordons were produced by holding a burnishing tool against the pot, squeezing the clay up to form a ridge. This leaves a tooled depression above and below the ridge. It will have been done after some drying and re-centring; certainly the sharper tooling and shaping found, for example, on the underside of some pedestal bases, will have been done at a secondary stage. All burnishing would be done after initial drying.

The craftsmanship attested to by this pottery at its best is, I think, obvious. Some vessels are very large, requiring skill to manufacture and to fire successfully; some are very elaborately shaped; and many show all the skills of the good potter, luting together body and pedestal, making symmetrical forms of some elaboration, and in some shapes, notably E1-2, imitating the lathe-turning techniques of wood and shale. The rippled forms are typologically earlier than the cordoned (see the notes to the B2 and B3 jar forms, and compare the dating, but note that typology does not always reflect absolute date). Within a few decades all sorts of new forms appear, with imports inspiring copies in new shapes such as platters and jugs (although the technique, of applying the handles in clay remained uncertain for a time); and strange forms such as E1-5 resulting from experimentation with shape. The first half of the 1st century AD saw these potters exploring the limits of their medium and technique.

### Red-surfaced copies of Gallo-Belgic forms

This variation of the usual native fabric is distinctive; it is characterised by a brown or grey core, with finely crushed grog that is often red itself, and pale red-orange smooth surfaces, evenly coloured, sometimes burnished and sometimes matt. The surface colour is Yellow/Brown 5B, sometimes 4B or 6B, in the Study Group for Romano-British Coarse Pottery's colour chart (1977). The pots are usually thin-walled and well modelled; the fabric is occasionally described as TR4, and there seems no doubt that it is inspired by imported samian and terra rubra.

There are red examples of most forms copying Gallo-Belgic shapes; but it is unusual for platter copies to be red-surfaced, since their originals are mostly TN. There are some red copies in the Herts.-Beds.-Bucks, area, Zones 7 and 8.

Of the G2 and G3 categories, more specialised and unusual copies of imports, it occurs only occasionally and for some odd miscellaneous forms. The exception is G2-3, which is the largest section here and has several red ones.

G4 and G6, girth beakers and jugs, are the forms where the red finish is most common. G4 is found almost entirely in Zones 7 and 8. G5 butt-beaker forms, however, also have a good many red examples in each category, and here the regional bias is not so evident. It is used for most of the G6 jugs, which do not copy samian or TR but usually white pipe-clay forms.

Dating: the idea goes back as far as the Welwyn Garden City chieftain grave, where the native jugs have the pale orange surfaces, and it may be assumed to begin at the time of the earliest imports at Braughing, in the last quarter of the 1st century BC. But Skeleton Green at Braughing had so many imports that it did not, apparently, need many copies, and this oxidised version of the native fabric had a slow start. It is not at all common at Sheepen; it appears in the centres of Hertfordshire settlement that were not as rich in imports as Braughing, notably at Prae Wood, where it is fairly common and which has a greater range of forms in this fabric than any other site; but whereas in the levels dated c.AD 5-40/5 it is not as noticeable as the grey wares, in levels of c.AD 30-50 it is very common indeed, and many specimens without the clear red surfaces are patchy orange-grey.

Throughout the type series vessels in this fabric are annotated with the letter R against the context symbol, whether they copy imports or not. This does not include those with buff surfaces, or those with patchy surfaces which seem to have acquired their colours in the accident of firing. 'R' designates those vessels which appear to have been deliberately fired to produce orange surfaces.

The production of the evenly-coloured oxidised surfaces requires a greater degree of control of firing conditions than the patchy grey reduced colouring of normal 'Belgic' pottery, and this, may be a factor in the late spread of the ware. The introduction of constructed kilns in Zone 8 may be a concomitant of the use of this ware for a variety of forms not related to imports (notably

El-1) as a built kiln ought to provide easier control of firing conditions; but there seems no doubt that many of the copies of imports were fired in non-structural kilns with complete success.

The red is caused by the presence of iron oxides in the clay; these pots are never oxidised all through, for the core is always brown or grey, and the grog inclusions brown or red. The free passage of air evidently does not occur throughout the whole firing; the surface finish is often dull and non-shiny.

### 3 Firing

Evidence for kilns is not earlier than the second quarter of the 1st century AD at the earliest, and it could all be from c.AD 40-50; these earliest kilns are often primitive or portable (as at Mucking and Rushden). None has much structure; we do not know what sort of superstructure has been destroyed. Several of those known have survived only because they were dug into the edges of ditches or were in shallow scooped hollows; many more must have been entirely at ground level. These conquest period kilns (see below) are of the basic single-flue up-draught construction, sometimes with a fixed central pedestal, and firebars (see Barton 1975, 30).

Prior to these clamp kilns must have been used. Such clamp or bonfire kilns are used very successfully by African potters today; long practice has given them considerable control over the firing, and large batches can be fired at once. Grog tempering is known (inf. Keith Nicklin, PCM). The pots are piled up and covered by the fuel, and the mound can be sealed with layers of turves and branches. The patchy colouring of 'Belgic' pottery indicates that the vessels were not kept completely covered as the fire burnt down; they are never black, or evenly coloured all through, but exhibit a variety of shades of grey-brown, and often a redder sandwich below each surface. The outer surfaces often have a noticeable patchiness of colouring, produced by varying circulation of air and proximity to other pots (cf. Reynolds 1979, 15).

'Belgic' pottery is not fired especially hard: Woods (1974, 269) estimates 750-800°C, and as noted above most of the samples used for thin sectioning had to be consolidated before cutting. Barton (1975, 28) suggests that firing temperatures were not sufficient to produce wasters. It is true that one seldom finds 'seconds' with less warping than would make the vessel unusable; one such is Prae Wood fig. 106 no.2, in Part 4 below (not a coarse ware pot). The grog for tempering may have used up any wasters that occurred; and unfortunately for the archaeologist, above-ground kilns with movable props, if any, and the recycling of wasters, leave absolutely nothing behind but some burnt soil and ashes.

It seems likely that the upsurge in pottery production in Zone 8 is due to the presence of the Roman army. The role of the army is subject to debate (see Greene 1979 for suggested, and untestable, mechanisms, and a minimal view of the active influence of the army in areas where good quality native pottery was

available) and it is uncertain how much direct influence it had on the introduction of the built kiln.

#### Kiln evidence, definite and possible

The following is a select list only, but illustrates the range of evidence.

##### Zone 1:

Colchester, Sheepen. See Hull in De Brisay 1972, 34-35: site L2 had a thick layer of ash and charcoal 12ft in diameter, containing one 'Belgic' waster of a 'cooking-pot' and with remains of a turf wall. But in Hawkes and Hull (1947, 123) this feature is site L7, with section. Apparently period I, AD 10-43.

Kelvedon (Britannia 5, 1974, 442, and fig. 16, 444; K. Rodwell 1979, 331). A row of three dug into edge of ditch of c.AD 43; ditch used as stokehole, trace of central pedestal. A few wasters, type not specified.

##### Zone 2:

Mucking (Jones and Rodwell 1973). About 20 'Belgo-Roman' prototype kilns making shell-tempered jars of C5-1 form, and 'buckets'. Plan, fig.3: shallow scoops or freestanding, and not all certainly pottery kilns. One had division into furnace, flue and stokepit, with firebars and wasters. No substantial structure; just post-conquest.

Gun Hill (Drury and Rodwell 1973, 62-64, and fig.7). Later 1st century AD; at least three single-flue updraught, and 'a series of shallow pits containing charcoal, ash and kiln debris', some dug into enclosure ditch. Essentially surface-built. Pots are derived from 'Belgic' forms; one fabric (C) was brown with grog and some shell.

Zones 3-5: none. See Miles 1975 for saltworks and firebars on the N Kent marshes, but no evidence for anything conquest period or earlier.

##### Zone 7:

Highgate (see gazetteer entry). No structural evidence but for debris in ditch.

Prae Wood (Wheeler and Wheeler 1936, pl.LXXVIa and p.44): two possibles, shown in plan on pi.XVI, adjoining the South Ditch in the area dated c.AD 30-50. Pl.LVI shows 'bricks' or firebars found in them; for sherds see Part 4 below, 'Hearths' in Area XXII-XXIII. The plate, LXXVI, shows furnace stokehole and short flue, standing on ground surface, the only structural remains being an outline wall of fired clay only a few cms high.

Crookhams (Rook 1968a, 55): 'oven' of a keyhole shape similar to Prae Wood, and possibly more. Firebars, etc., p.65.

Cholesbury Camp (Kimball 1934, 202): 'base and a portion of the wall of a small oven' in a horseshoe shape, the fired clay wall 11 ft

high at the closed end, curving to form a beehive shape. Only 3 ft long. Inside, fired clay lumps and charcoal, no sherds; the structure partly underlay Hearth 7, which contained 'Belgic' and 'pre-Belgic' sherds.

Zone 8:

Caldecotte (M. Petchey in Mynard 1979, 65-6, with plan and section). Small single-flue updraught kiln, Woods type IIA, with last batch of pots, local 'Belgic' forms in red-surfaced grog.

Rushden (Selkirk 1972; Britannia 3, 1972, 326; Woods 1974, fig.3). More than one, apparently movable and above ground. 'A burnt circular area and traces of a flue to one side and the remains of the broken firebars' (Selkirk 1972, 204). Pottery odd and unique forms, in orange fabric with red and yellow slip or paint; romanised, post-conquest.

Hardingstone (Woods 1974; see gazetteer entry). Claudian-Neronian? (Woods 1974, 271, h.30; 1969, 24).

Quinton (Woods 1974; Friendship-Taylor 1974, 8-14): 'One kiln-shaped feature and eight circular ovens or furnaces'. No good structural evidence; only one contained datable sherds, 66a-d, scraps; Flavian, apparently.

Northampton, Camp Hill (Shaw 1979; see gazetteer entry). Several kilns, three of c.50 AD. Single-flue updraught, portable furniture. Last batches present, limited number of types, local late 'Belgic' forms, red-surfaces, mixed local tempering and grog.

Successful experimental kilns at Boston and Barton-on-Humber, of single-flue updraught construction, are no larger than some of the 'structures' described above, such as the 'hearths' at Prae Wood (Coles 1973, 149-152).